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Mathematical Morsels: A Monthly Voyage of Problem Solving Goodness

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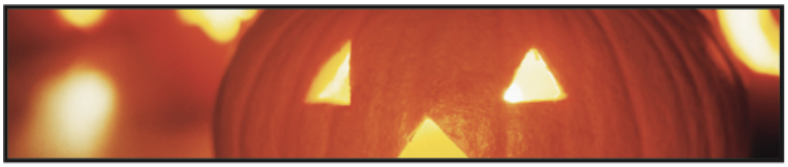
In this column, we share a collection of rich tasks, those well-suited for multiple solution methods (and potentially more than one correct answer). Email links to video podcasts, screencasts, or Vine videos highlighting solution methods to octm.morsels@gmail.com. This makes a great Fall semester project for your students. We'll share selected solutions in the Spring issue.

This Fall's morsels focus on open-ended problem solving to explore on your own, with colleagues, or with your students. Some are classics and some are less known, however, they will all challenge you to persevere and think of multiple approaches! They come from a variety of resources that you find at the end of the article.

October

A 5, 12, 13 triangle is a planar figure where its perimeter and area are numerically equal (both equal to 30). Can you find more triangles that have this curious property? How about other shapes, such as rectangles?



November

Insert + and signs as many times as necessary in the string 123456789 to find a calculation that yields exactly 100. For example, 12 + 3 4 5 + 6 + 78 +9 = 99 (so close!). Can you find them all?

December

At a faculty meeting, each teacher was given one ticket numbered by consecutive integers starting with 1. Andrew noticed that the sum of the ticket numbers less than his number equaled the sum of the ticket numbers above his number. If there are less than 100 total people at the meeting what was Andrews ticket number?

January

Cara received a check and went to her bank to cash it. The bank teller, without adequate coffee, accidentally interchanged dollars and cents; that is, what was written for cents was given in dollars, and vice versa. It was not until Cara bought a piece of candy for five cents did she realize the tellers error, at which point she had twice the amount of money written originally on the check. How much money was the check made out for?

February

There are 9 sticks, which have unique lengths of 1 inch, 2 inches, 3 inches, . . . up to 9 inches. Three sticks are chosen at random without replacement. What is the probability the three sticks will form a triangle?

March

Consider a regular hexagon of side length 1. Consider the set T of all triangles formed by connecting any three vertices of the hexagon by line segments. What is the average of all the areas contained in T?

References

Pelfrey, R. (2000). *Open-ended questions for mathematics*. Available on-line at `http://www.uky.edu/OtherOrgs/ARSI/www.uky.edu/pub/arsi/openresponsequestions/mathorq.pdf`

Karafiol, P., Dreyer, P., Early, E., Feng, Z., Fisher, B., Franco, Z., Jeuell, C., Luo, W., Niedermaier, A., Soffer, A., & Wepsic, E. (2013). *American Regional Mathematics League (ARML) 2013 contest file*. Available on-line at `http://www.arml.com/arml_development/public_contest_files/2013_contest_file/2013_Contest_Final_Version.pdf`